

## Community Participation in The Control and Prevention of DHF in Indonesia

Sumarmo Poorwo SOEDARMO

*Professor and Head, National Institute of Health Research and Development Ministry of Health, Jakarta, Indonesia*

**Abstract :** Dengue hemorrhagic fever is considered as a public health problem in Indonesia. During 1968–1991, a total of 260,769 cases with 10,104 deaths were reported in 24 out of 27 provinces. DHF has been endemic for many years and an average of 10,431 cases with 404.2 deaths are reported every year. Under the Ministry of Health coordination, the national DHF control program has been carried out to reduce cases and deaths by early diagnoses and case management, and to prevent the spread of disease by vector control. The program has significantly reduced the CFR from 41.3% in 1968 to 2.3% in 1993. However, DHF cases and deaths are still reported every year.

Since there are no effective treatment and vaccine available, the only way to reduce incidence and prevent the epidemics is to control *Aedes aegypti*, the main vector of DHF. Over the past two decades, too much reliance has been placed on the use of insecticides for vector control. Many studies and experiences indicated that such control has been ineffective for several reasons. These include: surveillance for epidemic DHF is not sensitive and adultciding is not effective. The most effective DHF vector control will be through the reduction of source of infection based on community participation.

This paper provides information on the Indonesian experience in conducting the DHF vector control program through community participation. The source reduction campaign in Pekalongan, Central Java in 1985 showed 57% reduction of Breteau index, and 52% of container index six months after the initiation of the campaign. In Wonosari, Yogyakarta, indicated 56% reduction of the larval indices after 3 months campaign. In Sukabumi, West Java, in 1989 an effective percentage change was reported of knowledge 71.2%, attitude 39.8% and practice 46.5% after 6 months campaign. Moreover, it indicated 79% reduction of house index, 18% of container index, and 80% of Breteau index.

A strong commitment of policy makers in all sectors and levels of organizations including governmental and non governmental organizations should be obtained to guarantee the success of the program. They would facilitate the integration of health education campaign in every sector of community development. Mobilization of community resources from the center to the village level should be conducted to support the program. Women's organizations and housewives should be actively involved in the operational activities under the supervision of health workers. In addition, law and regulation should be introduced to

In addition, the mosquitoes could replace their entire original population with new generation through a geometric progression of reproduction within several weeks. On the other hand, removing every possible breeding place in the environment could control all mosquitoes without replacement by new generations. It is considered scientifically sound, practical and economically feasible. Thus source reduction is the most effective method of *Ae. aegypti* control (Lok Chan Kai 1985).

The vector control program is conducted by a combination of malathion fogging, temephos larviciding and source reduction. The mass fogging is carried out during an epidemic under the supervision of Health Officers. The focal fogging supported by temephos larviciding is applied in an area within a radius of 100 m of DHF case dwelling. This is carried out by volunteers under the supervision of health workers. Mass larviciding during an epidemic and in highly endemic areas is considered as the complementary measure, and especially in high risk localities before periods when outbreaks are expected. The source reduction is conducted by community health education through mass media. Mass fogging and larviciding have been expensive both in terms of the chemicals and equipment used. They consume much time and labour if used as the primary methods of prevention.

More priority should be given to the source reduction through community participation in order to control the occurrence of DHF.

DHF is often, closely associated with poor environmental sanitation including improper housing, inadequate water supplies and lack of sanitation facilities. *Ae. aegypti* bred in and around houses principally can be controlled by individual and community actions. Environmental sanitation is the key method of eliminating the number of *Ae. aegypti* breeding places as well as adult harbourages. Breeding places of *Aedes* in the urban environment are mainly man-made water containers such as water storage tanks, cisterns, barrels, watering troughs, sewer inlets and catch basins, cesspools, torn drains and street gutters, roof gutters, discarded tin cans, buckets and bottles, flower vases and pots, ornamental garden pools, rubber tyres and drums. In the suburban and rural environment, the breeding places may, in addition to the above, include plant water-holding cavities such as tree holes, leaf axile of banana, bamboo internodes, coconut husks, fallen palm spatters and flower bracts.

The community should participate by undertaking the disposal of all unused objects that may collect water such as old tyres, empty tins, and bottles, broken jars, etc., and by routinely changing the water in flower vases once a week. Whenever possible water storage containers should be turned upside down before refilling with water. Water jars and drums, that cannot be disposed of, should be covered to prevent egg-laying by *Ae. aegypti*, or cleaned and scrubbed weekly. When this is not possible owing to their shape or size, *Aedes* larvae should be eliminated by transferring the water from one container to another. Coconut shells and husks should be buried or burned, tree holes can be filled with sand or cement, leaf axils should be punctured and the tops of bamboo fences should be altered to prevent accumulation of water and mosquito breeding. Larger water tanks

number of cases increased from 473.8 to 23,896 per year with deaths increased from 65.8 to 712.2. However, an average of CFR is reduced from 21.7% to 3.3%. The Directorate General for Communicable Disease Control and Environmental Health (DG CDC & EH) reported a number of 7,392 cases with 171 deaths in 24 provinces from January to July, 1993. It is estimated that the average number of cases and deaths in the next few years will be lower than the previous year. The number of cases and deaths is shown in the following table.

DHF is caused by dengue virus. Four serotypes of dengue virus: DEN-1, DEN-2, DEN-3, and DEN-4 were isolated from 297 patients in 8 cities during the epidemic of 1975-79 (Wuryadi 1986), 164 patients during 1980-83, and 377 patients in Jakarta during 1985-86 (Sumarmo et al. 1986). DEN-3 was the predominant virus isolated from such epidemics. It caused severe clinical syndrome and deaths. They are antigenically very similar to each other, but they are different enough to elicit only partial cross protection after infection by one of them. After an incubation period of 3-10 days, the virus is present in the blood of patients during the acute phase of disease.

In the human being, each of the four types of dengue virus has been associated with classical dengue and with DHF. DSS occurs with high frequency in children who have experienced previous dengue infection, and infants with waning levels of maternal dengue antibody. Many cases and deaths were children under 5 years of age. Case distribution has changed from mainly children to more than 10 years of age. More cases are found in the young age group. Transmission of disease mainly occurred in association with the rainy season in the first and last part of the year.

Dengue virus is transmitted to man through mosquito bites. The principal mosquito vector of DHF is *Ae. aegypti*. It breeds in a wide variety of microhabitats and in a range of water conditions from clear to highly contaminated. Eggs are laid in the relatively clear looking water of domestic water containers and rock pools, in leave exiles, and in water filling, decaying, organic matter, such as tree holes. *Ae. albopictus* is a potential

**Table 1.** Number of reported DHF cases and deaths in Indonesia 1968-1993

Year	Number			Average/year		
	years	cases	deaths	cases	deaths	CFR
1968-72	5	2,369	329	473.8	65.8	21.7
1973-77	5	31,712	1,552	6,342.4	310.4	5.1
1978-82	5	26,847	1,278	5,369.4	255.6	4.7
1983-87	5	80,359	3,046	16,072.0	609.2	3.7
1988-92	5	119,482	3,561	23,896.0	712.2	3.3
1993*)	0.5	7,392	171	14,784.0	342.0	2.3
Total	25	260,769	10,104	10,431.0	404.2	7.7

\*) DG CDC & EH's (1993) report and an estimated average number

vector of DHF and reported everywhere in the country, however, it is less efficient than *Ae. aegypti*. *Aedes* mosquito is the most efficient vector because of its domestic habit. The female mosquito bites man during the day and can transmit dengue immediately after feeding on a person whose blood contains virus. DHF is essentially considered a disease due to man-made containers in and around the house.

### DHF CONTROL AND PREVENTION

Under the Ministry of Health coordination, DHF control program has been conducted to reduce morbidity and mortality by early diagnoses and case management, and to prevent the spread of disease by vector control. The main inputs for the reduction of mortality are training of medical officers and nurses, and assisting regional laboratory services with equipment, supplies and health education campaigns. The training of medical officers on diagnoses and case management was started after the first epidemic. The training was assisted by WHO consultants for researchers, medical officers from hospitals, and program officers from several big cities including Jakarta. In addition, a series of workshops and training courses were held annually by the DG CDC & EH for clinical and control personnel at various levels including medical officers at health centers.

To date, most medical officers and nurses have been trained on various clinical problems of DHF. Guidelines on diagnoses and case management were published and distributed to all medical practitioners throughout the country. In addition, guidelines for nursing DHF cases were prepared by a group of experienced nurses to further improve the care of DHF patients by nurses in the hospitals. Laboratory services have been strengthened to support accurate diagnoses by medical officers at various levels. Health education campaign through different levels of media communication such as television, radio, volunteers have brought and motivated people to early consultation in hospitals, health centers, or private practitioners. The input from the community has contributed to a reduction in mortality. This resulted in a drastic reduction of the case fatality rate from 41.3% in 1968 to 2.3% in 1993.

However, a number of DHF cases and deaths are still reported every year. Since there are no effective treatment and vaccine available, the only method to reduce incidence and prevent the epidemic DHF is to control the vector. The most important vector of DHF is *Ae. aegypti*. This vector should be the main target of control activities. Other vectors should be considered only when there is clear evidence in the transmission of the disease.

### VECTOR CONTROL

In the case of *Ae. aegypti*, the principal vector control is to kill adult mosquitoes and eliminate breeding places. Killing all adults mosquitoes in the environment using insecticides is not feasible. It is very expensive, not practical, and consumes high cost of labor.

increase the effectiveness of the community participation.

## INTRODUCTION

Dengue hemorrhagic fever (DHF) is considered one of the public health problems in Indonesia. It has spread out to urban and rural areas in all provinces. DHF has been endemic for many years and caused many cases and deaths of children. Case distribution has changed from mainly children to older age group, and more cases were found in the young age group. Transmission of disease mainly occurred in association with the rainy season in the first and last part of the year.

The dengue viruses associated with the DHF epidemic have been isolated from patients in several cities. Four serotypes were reported during the epidemics. Some of these caused severe clinical syndrome and deaths. *Aedes aegypti* is the main vector and *Ae. albopictus* is a potential one. They transmit viruses from the DHF patients to people who would be infected.

Under the Ministry of Health coordination, DHF control program has been conducted to reduce cases and deaths by early diagnoses and case management, and to prevent the spread of disease by vector control. The program has significantly reduced the case fatality rate (CFR). However, a number of DHF cases and deaths are still reported every year. Since there are no effective treatment and vaccine available, the only way to reduce incidence and thus to prevent the epidemic DHF is to control *Ae. aegypti*.

Over the past two decades too much reliance has been placed on the use of insecticides to control *Ae. aegypti*. Many studies and experiences indicated that such control has been ineffective due to several reasons. These include: surveillance for epidemic DHF is not sensitive and adulticiding is not effective. The most effective way to control DHF vector is source reduction. This method should be community based and integrated into various sectors of development.

This paper provides information on Indonesian experience in conducting DHF vector control through community participation. Transmission of DHF, its vector control, and several strategies for increasing community participation are discussed. These include building policy makers commitment, participating community leaders, integrating health education campaign into primary health care (PHC), involving women's organizations and housewives and mobilizing the available community resources.

## TRANSMISSION OF DHF

DHF is an acute febrile illness characterized clinically by hemorrhagic diathesis and a tendency to develop a shock syndrome (DSS) that may be fatal. It was reported the first time in 1968 in Jakarta and Surabaya. During 1968-1992, a total of 260,769 cases with 10,104 deaths were reported in 24 out of 27 provinces. DHF has been endemic for 25 years and an average of 10,431 cases with 404.2 deaths were reported every year. An average

should be covered so as to allow rainwater to enter but exclude egg-laying mosquitoes.

### COMMUNITY PARTICIPATION

The main component of DHF vector control program is community participation. This is one of the most promising strategies to the control and prevention of DHF by eliminating *Ae. aegypti* breeding places. It is not only the most effective but also the only known radical intervention. The important problem in the community participation is how to create awareness and motivate the community to support activities. Many people still misunderstand DHF transmission. They may only partially understand the relationship between the illness and vector. They may think that cleaning up stagnant ponds would help prevent DHF or that a mosquito bites mainly at night. It is difficult to make people understand, be aware of, and fully participate in controlling activities without any supervision. In addition information, education and communication materials do not address such possible misunderstandings, and so they would not provide an accurate know-how about DHF prevention.

Community poor knowledge and practice about vector control lead to the occurrence of DHF epidemic. For example, several epidemics have occurred in Pontianak, West Kalimantan since 1977. The DG CDC & EH reported that of the 388 households interviewed in July 1986, 27.1% knew about emptying and refilling of water storage, 17.3% about proper closures of the lids and 26.8% about removing and discarding materials (Suroso et al. 1986). Improving community knowledge and awareness is very important to control and prevent the occurrence of the epidemics. Health education campaign should be provided regularly based on simple but accurate information by using all available media including books, lectures, newspapers, radios, televisions, pamphlets, brochures, etc. In the meantime, target should be the whole population, and more specific efforts should be directed towards providing information for key persons in the community.

Community participation requires a strong moral legal commitment of policy makers, participation of community leaders, integration of control activities into another sector of development, mobilization of resources, and participation of women's organizations and housewives in the villages.

The national commitment of policy makers from the highest to the lowest levels is very important to support the achievement of community participation. Such commitment could be formulated in the law and regulation which would affect everybody in the community. For example, in Singapore, strong legislative measures along with municipal directives have brought DHF under control. In Brazil, the structure of DHF campaign was mainly vertical with top-down planning, management and supervision. In Cuba and China, a more integrated community based approach, involving volunteers and IEC activities were used. In Indonesia, such commitment is still limited to the public health policy makers. They should convince policy makers from other sectors to increase their commitment for the DHF vector control.

There are formal and traditional community leaders. The formal leaders activities are based on the organization system and procedures, and those of the informal leaders are based on personal charisma of community leaders and their ability to gain the loyalty of community members. The important factor to understand community participation is the relationship between leaders and followers, which may vary considerably from one situation to the other. The strategy to approach the formal and informal leaders is carried out by PHC. The main activities for DHF vector control are carried out on the network of general health services in the context of PHC. The DG CDC & EH is responsible for coordinating and implementing of control activities at the central level. Office of MOH in the provinces and Provincial Health Services are responsible for controlling activities in the provinces. Office of MOH in the districts and District Health Services are responsible for controlling activities in the districts. Health Center is responsible for activities in the districts and villages.

The Director General for CDC & EH, the Director of DHF Control Program, Head of Health Provinces, Districts, and Health Centers and Sub-Centers invited the formal and informal leaders to participate in the meeting, workshops, training and campaign activities. Such activities were carried out in the central office, provinces, districts, sub-districts, and village levels.

Community participation should be integrated into other community activities because of several reasons. These include many different programs competing for the time and labor of community members. Housewives may be involved in school programs for children education, water supply and sanitation programs, integrated health post (Posyandu), agriculture and community development. Any new projects that are introduced should not interfere with ongoing activities including women's daily work routines, which will help to sustain interest in the activities. For example, several DHF vector control activities in West Java were integrated into Posyandu and women education welfare (PKK) activities.

There are various kinds of village volunteers, cadres and change agents within the community. Among them women represent a very important group whose participation enhances the possibility of reaching individual households and sustaining community support. Women's organizations such as Dasa Wisma and PKK should get involved (participate) in coordination and implementation activities. Most village volunteers, being responsible for education and inspection were women. Women were more highly motivated than men to help the vector control program, because they were particularly interested in cleanliness. Women's role as the main caretakers of children's health is another important factor. The highest risk group appears to be that of children under 10 years of age and over one year. If mother are well-informed and can be taught about signs and symptoms of DHF, this can contribute to a decline in the child mortality rate. Mothers of DHF afflicted children may be an ideal group for health educators and motivators for other women as well. Grandmothers are another group that should be approached, since they are often the only ones remaining at home, and their opinions concerning domestic affairs

are often very influential.

Community participation requires major inputs of labor, time and other resources from community members. It needs excellent management, supervision, discipline, and integration with all PHC activities, retraining of village health workers, development of health information materials, community organization or management of technical and material inputs.

Community organization, key persons, formal and informal leaders, head of households, women's organizations, housewives should be involved in the vector control activities. They should be involved in planning executing, and evaluating, the vector control activities in the villages. Their involvement is the key factor to the success of the vector control. It means that they have an opportunity to develop and control their own environment. A pilot project of community participation for source reduction was conducted in Banyumanik, Semarang, Central Java in 1984. A series of health education campaign was held at the levels of municipality, sub-district, village, kampung, and households. Formal and informal leaders were mobilized to participate in health education campaign, and households were asked to participate in eliminating *Aedes* breeding places. The results indicated that the Breteau index reduced from 60 in 1984 to 15 in 1985.

The source reduction campaign was also conducted in Pekalongan, Central Java in 1985. Communication activities were conducted through creating local decision makers commitment, mobilizing formal and informal leaders, integrating activities into other sectors, participating women's organizations, and households. After six months, the results showed 57% reduction of Breteau index and 52% of container index from the previous indices.

An intensified source reduction campaign was conducted in Wonosari, Yogyakarta in 1985. Local community was trained to participate in the vector control. Each person was responsible for 500 premises, and he provided health education campaign for removing breeding places. After a 3 month campaign, there was found a 56% reduction of the larval indices from the previous indices.

The effectiveness of community participation was studied in Sukabumi, West Java in 1989. The strong commitment of the district of Sukabumi supported the success of the campaign. The involvement of all leaders including formal and informal leaders at sub-district, and village levels made the campaign reach all levels of community. Owing to the participation of women's organizations (Dasa Wisma) and households the regular activities of removing the breeding places and keeping the premises clean turned out to be a great success. After 6 month intervention, the results reported that the effective percentage change on knowledge was 71.2%, attitude 39.8% and behavior 46.5%. The reduction of house index was 76%, container index 18%, and Breteau index 80% from the previous indices.

In addition, the schools like other public areas may often be the foci sites to acquire the disease. Principal of the schools, teachers, school staff, and school children should actively participate in eliminating *Aedes* breeding places. Health education campaign



should be integrated into the school program so as to provide better knowledge and awareness of the vector control activities.

### SUMMARY

DHF has been endemic for many years and caused many cases and deaths of children. Since there are no effective treatment and vaccine available, vector control program is the only way to control and prevent DHF. The program is based on health education campaign and community participation. The health education should be provided regularly based on a simple but accurate information using all available media of communication. The target of this should be the whole population. Community participation requires strong commitment of policy makers, involvement of community leaders, integration of control activities into another sector development, mobilization of resources, and participation of women's organizations and housewives.

Experience has indicated that at the district, sub-district and village levels, strong commitment of decision makers, participation of local leaders, mobilization of resources, and active participation of women organizations and housewives under the supervision of women cadres and health workers in the villages, have significantly reduced several indices such as house index, container index, and Breteau index. In addition, such participation has increased the community knowledge, attitude and practice in eliminating *Aedes* breeding places. Long term vector control should be based on health education and community participation supported by legislation and law enforcement. It is hoped that such a program will contribute to be control of DHF transmission.

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